NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

THEORY: GENERAL MICROBIOLOGY II SBB 2105

DECEMBER 2002

2 ½ HOURS (100 marks)

INSTRUCTIONS

Answer Four (4) questions, two from each section. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer where appropriate with large, clearly labelled diagrams.

SECTION A

1. Write short notes on:
   (a) the biological significance of plasmids. (10 marks)
   (b) conjugation and transduction as methods of gene transfer in bacteria. (15 marks)

2.(a) Distinguish between intrinsic and extrinsic factors affecting microbial growth (2 marks)
   (b) List and give brief descriptions of the intrinsic and extrinsic factors determining growth rates in microbial populations (23 marks)

3.(a) List and describe briefly, any three parameters that can be used for monitoring bacterial growth. (6 marks)
   (b) If a bacterial culture contains 10 cells per milliliter at zero time and 10^7 cells per milliliter five hours later, calculate its growth rate and generation time. (6 marks)

   Note: $g = \frac{t \log 2}{\log_b - \log_a}$ $\log_2 = 0.301$

   (c) Describe using specific examples, the mechanism of diauxy in microbial growth. (7 marks)
   (d) Discuss the role of exoenzymes in microbial nutrition with reference to specific genera. (6 marks)

SECTION B

4.(a) Describe the mode of action of the following:
   (i) B-Lactams (3 marks)
   (ii) Aminoglycosides (2 marks)
   (iii) Tetracyclines (2 marks)
   (iv) Polymyxins (2 marks)
   (v) Nalidix acid (2 marks)
   (vi) Rifamycins (2 marks)
   (vi) Sulphanamides (3 marks)

   (b) Explain why bacteria may show some resistance to specific antibiotics. (9 marks)

5.(a) Compare and contrast cell-wall structure in Gram-negative and Gram-positive bacteria. (15 marks)

(b) Discuss the role of cell wall type in determining physiological characteristics of bacterial groups. (10 marks)

6.(a) Describe the types of interaction between different microbial species in mixed populations. (15 marks)

(b) Discuss the practical significance of inter-specific interactions exhibited by the lactic acid bacteria. (10 marks)

END OF QUESTION PAPER

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